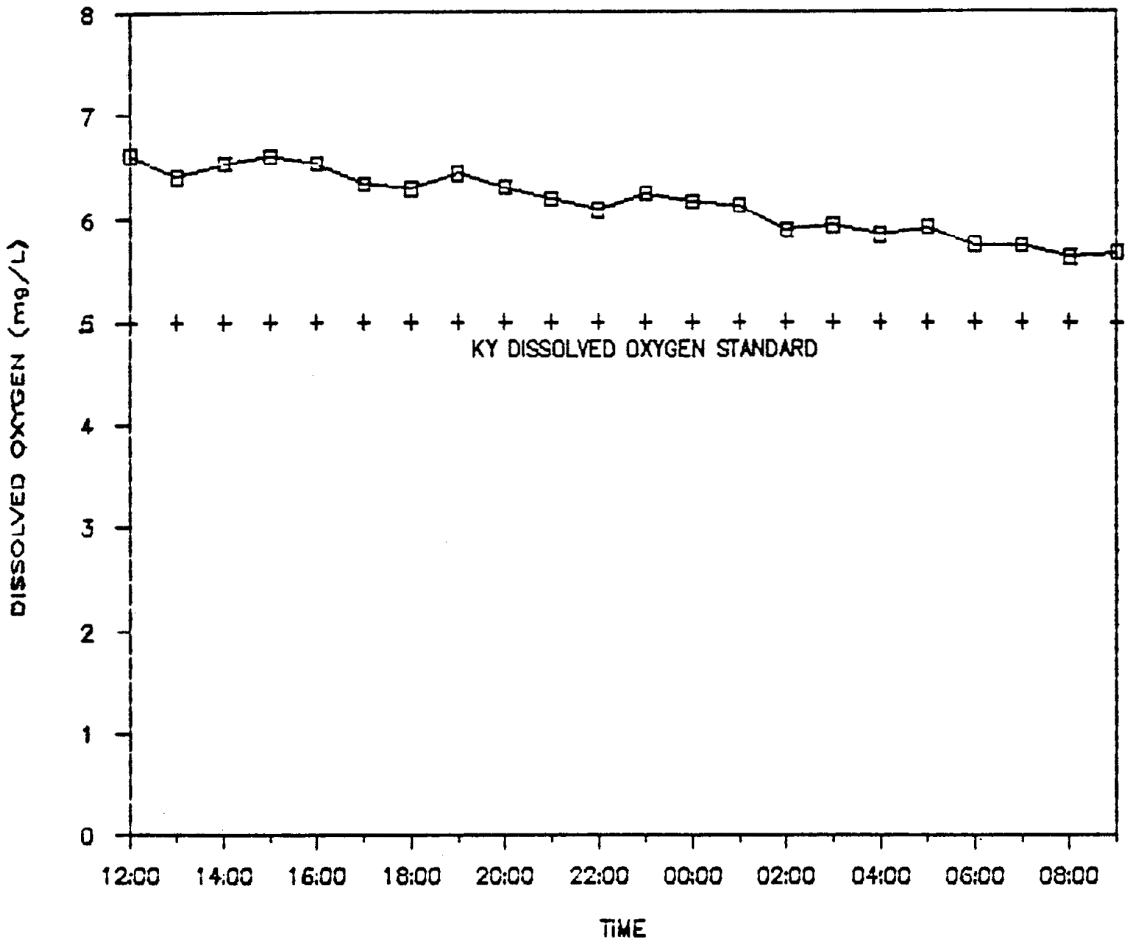
Table 5. Dissolved Oxygen Deficits in Harrods Creek

HARRODS CK STATION	TEMPERATURE (Deg C.)	DO (mg/L)	DO SATURATION	DO DEFICIT
MILE 12.3	29.5	11.0	7.60	+3.40
MILE 8.9	28.7	10.8	7.65	+3.15
MILE 6.9	26.1	7.2	8.10	-0.90
MILE 4.2	24.4	6.6	8.35	-1.75
MILE 3.6	25.0	6.3	8.25	-1.95
MILE 2.6	24.5	4.8	8.35	-3.55
MILE 2.4	25.0	4.2	8.25	-4.05
MILE 2.3	24.5	3.6	8.35	-4.75
MILE 2.1	24.8	3.2	8.30	-5.10
MILE 1.7	25.5	2.5	8.20	-5.70
MILE 1.6	25.0	2.2	8.25	-6.05
MILE 1.5	26.0	3.3	8.10	-4.80
MILE 0.2	26.5	3.4	8.05	-4.65

DO Saturation values taken from QUAL2E USERS MANUAL, and rounded to nearest 0.05 mg/L.

Fig. 3. DO Concentrations at mile 3.6
(July 10 and 11, 1990)



500 feet below the facility, were lower than those at mile 3.6. and ranged from 5.0 to 6.1 mg/L (Figure 4). The increase in DO observed during the night of July 11 is probably the result of rainfall that occurred. The National Weather Service measured 0.29 inches of rain on July 11 and 0.24 inches on July 12 at Standiford Field in Louisville. Rainfall began in late afternoon on July 11. Temperature ranged from 24.7 to 26.7"C. The minimum daily average dissolved oxygen standard was not met during the entire period at mile 2.2, ranging from a low of about 3.0 mg/L to a high of 4.3 mg/L (Figure 5). This station also consistently violated the instantaneous minimum standard of 4.0 mg/L. The observed increase in DO over the sampling period is attributed to the rainfall on July 11 and 12. Temperature ranged from 25.9 to 26.8°C. Data collected at mile 1.5 exhibited a more typical curve, with an increase in DO in late afternoon and a decrease at night (Figure 6). Again, however, concentrations were less than the 4.0 mg/L standard for much of the period, ranging from 2.8 to 5.8 mg/L. Temperature varied from 26.6 to 28.20°C.

Water samples were analyzed for 5-day carbonaceous biochemical oxygen demand ($CBOD_5$), ammonia nitrogen, and phosphorous (Table 3). Concentrations of $CBOD_5$, and ammonia were very low at all 11 stream sites. $CBOD_5$ ranged from 1.1 to 3.4 mg/L and ammonia varied from less than 0.05 mg/L (the detection limit) to 0.23 mg/L. Effluent concentrations from the three treatment plants were also very low, ranging from 1.1 to 5.1 mg/L $CBOD_5$ and less than 0.05 to 0.21 mg/L ammonia. These effluent concentrations were much lower than expected, and are well below the facilityies permit limits. This high degree of treatment may be due to increased residence times within the facilities because they are currently operating at less than design flows. The Paramont Estates facility has a design capacity of 0.4 million gallons per day (mgd), but was operating at only .001 mgd when measured on July 10. This is a new subdivision that is not yet fully developed. Hunting Creek South has been approved to expand to 0.25 mgd, yet is operating at 0.09 mgd. The Timberlake STP is designed for 0.15 mgd but is operating at 0.04 mgd. Full design flows are expected to be realized as development currently under construction comes on-line.

Total phosphorous concentrations were variable, and lower in the free-flowing sections of Harrods Creek than the backwater area. Concentrations from the wastewater facilities are typical of domestic wastes, ranging from 5 to 6 mg/L. Levels in South Fork Harrods Creek and the unnamed tributary above Putney's Pond were high, and indicative of the wastewater effluent flowing into these streams. The flowing sections of Harrods Creek and Wolf Pen Branch, which is spring fed, had concentrations of 0.005 to 0.02 mg/L. Phosphorous

Fig. 4. DO Concentrations at mile 3.3
(July 11 and 12, 1990)